dom, and it is found that where telephones alone are useless because of the induction of adjacent wires, the instrument acts admirably. The undulatory current produced by sonorous vibrations is so intense that a person speaking about a foot away from a transmitter has been heard ten feet from an ordinary telephone in Manchester thirty-six miles away by wire, and this although the induction from some thirty adjacent wires had to be overcome, and we may add that the intensity of the sound may be largely augmented by employing increased battery power.

Four carbon pencils are nicely centred and loosely held in four blocks of carbon, *a b c d;* two opposite blocks, *a* and *c*, are connected in circuit with a battery and the primary wire of an induction-coil. The efficiency of the arrangement is now made complete by having a telephone in the secondary circuit. The carbon blocks are mounted on a thin wooden diaphragm, and consequently are not seen in Fig. 3, which represents one form of the finished instrument.

For some months past an interesting and highly successful operation has been made every Sunday. One of these transmitters is fixed in the pulpit of one of the Halifax places of worship. Its position is not over-favourable, being half hidden so as to escape attention, and thus to some extent its efficiency is interfered with. In the nether regions, where the organ-blowing apparatus is found, a Clamond's thermo-electric pile is placed, and one of the first duties of the sexton on a Sunday morning and evening is to light a gas jet under the pile. In this way a sufficient supply of electricity is obtained to work exceedingly well at a cost of less than 2*d.* per Sunday in gas consumed. On the outskirts of the town several houses have telephones in the secondary circuit, one of these belonging to an invalided lady, and the service, from the opening voluntary to the parting benediction, is heard plainly by every one. The rendering of the music is especially fine, sounding to the observer, sat at ease in an arm-chair, as if proceeding from a neighbouring room with the door slightly ajar.

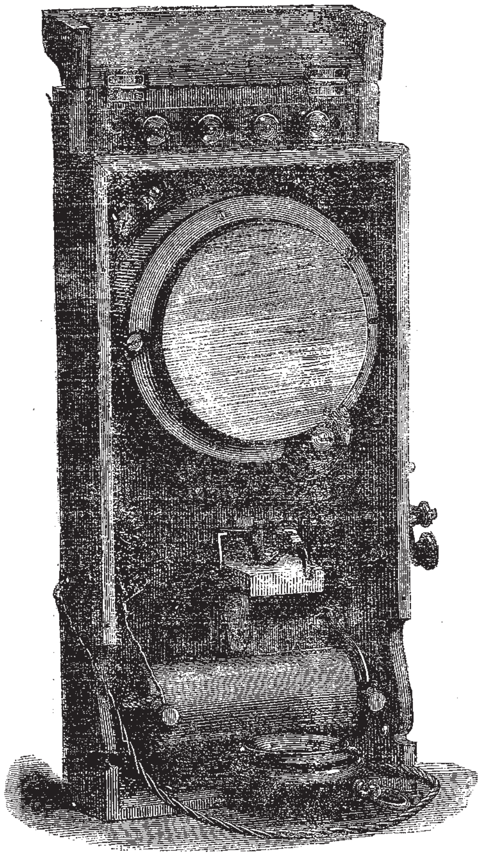

Fig. 3.

William Ackroyd

Colour-Blindness

When your able reviewer Prof. Pole so plainly intimates, in Nature, vol. xx. pp. 477 to 480, that he does not consider any of the theories of colour-blindness he has mentioned to be altogether sufficient for the observed facts, and that he may return to the subject in a future number, I trust he may then take some notice of my views, as honoured by the Royal Society, Edinburgh, in vol. xxviii. of their *Transactions*.

At all events, it is much to be hoped that in his own future descriptions, he will define his colours more accurately than by the naked eye estimations and names of even those who are allowed to possess normal vision. For, as I have shown in the paper above alluded to, there are physical distinctions, amounting to more than the oppositions of black and white, and reacting on colour, between many pigments generally reputed by the world to be all of the same colour to the eye.

To speak therefore of green, or red, or brown is nothing; but it is what green, and what red, and what brown that must be settled, as a preliminary to any further safe observation on the subject.

Piazzi Smyth

15, Royal Terrace, Edinburgh, September 19

The Carving of Valleys

In the course of a recent visit to Loch Maree, I observed an interesting geological phenomenon in a glen on the east side of the loch, which is traversed in ascending Ben Slioch, from Kinlochewe, and which is called, I understand, Glen Beansdale. This glen, in its lower part at least, follows the line of division between the "fundamental gneiss," which rises in a gradual slope on the north side, and the "Cambrian sandstone," which on the south side forms a fine cliff, terminating at the base in a long steep "*débris* line." The stream, which is of considerable size, originally ran close to the foot of this cliff until it reached the wide valley which contains the loch; but at some period a large "bergfall" of rocks from the sandstone cliff has dammed up the original bed, and diverted the stream into a new course, diagonally across the gentle slopes of gneiss, which previously formed the north side of the glen. This new course is marked, first, by a small depression or gully in the flow of the glen, and secondly, in the middle of this, by a narrow ravine with vertical sides, just wide enough to contain the stream which foams at the bottom.

There is nothing in itself very remarkable about this diversion of a stream; but the point which gives the case its interest is that an inferior limit can be fixed for the time at which the diversion took place. For, on descending into the secondary depression above mentioned, I was able to trace the glaciation, or planing down by ice of the edges of the gneiss (which was admirably clear on these slopes) right down to the brink of the little ravine containing the stream, thus showing conclusively that the diversion had taken place *before* the glacial period, and so long before that the stream had time to cut a channel sufficient to guide the glacier in its flow, and divert it from the work it would otherwise have accomplished in clearing away the remains of the berg-fall, and re-opening the old river-course. Thus it will be seen that in the new channel we have an example of the work which can be done by a mountain stream during a period dating back at least beyond the glacial epoch; while the old channel exemplifies the work done in the same time by the various agencies of "sub-aërial waste"—rain, wind, frost, &c.—without a stream to assist them, either by direct erosion of its own or by sweeping away the *débris* which they had brought down.

What, then, are the phenomena presented by these two cases? In the first, the only work which can really be ascribed to the stream is the cutting of the deep narrow gorge at the bottom of which it now runs; for with regard to the wider depression above (itself a mere furrow in the main flow of the glen), it is impossible to say how much has been due to the planing action of the ice. In the second, the bottom of the old channel, if there be any power in "sub-aërial waste," should be choked by the *débris* which has come down from its sides, whereas I was easily able to detect live rock within a few feet of the tiny runnel which now drains the gully, and which itself picks its way among stones and boulders that are clearly nothing but the cumbered bed of the old-world torrent.

The question I wish to ask is whether the study of these two examples is not sufficient to produce something like a conviction that the modern school of geologists (as worthily represented by

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the President-Elect of the British Association) is after all in error, and that the true agency which has carved out our valleys and given us our mountain scenery is still to seek. The evidence of the new channel agrees with that to be found elsewhere (on its grandest scale in the cañons of North America), in showing that the action of streams is to excavate not open valleys, but narrow and vertical clefts. On the other hand, the agencies of "sub-aërial waste" are seen to have worked their will for untold ages on the Cambrian sandstone of Glen Beansdale, and to have produced—nothing. They have not even removed the blocks of the old berg-fall, which looked as if they might have fallen within the memory of man, instead of at a date which must be reckoned by thousands, if not millions, of years. There remains the power of ice, which I am by no means disposed to undervalue; but the traces of the last "glacial period" are in this case clear enough, and amount at most to a slight deepening of the lower part of the glen, while to assume previous and much more intense glacial action, of which no direct evidence remains, would scarcely be justifiable. WALTER R. BROWNE

A "Nightly Resurrection"

YESTERDAY, in the *Pall Mall Budget* of July 11, 1879, p. 22, in a review of Mr. Stevenson's—"Travels with a Donkey in the Cevennes," I read the following, which is an extract of Mr. Stevenson's book. It is a very interesting observation. He slept a good deal under trees at night, and he says: "And there is one stirring hour unknown to those who dwell in houses, when a wakeful influence goes abroad, and all the out-door world (meaning animals and men who sleep in the open) are on their feet. It is then that the cock first crows. . . . Cattle awake in the meadows, sheep break their fast on dewy hill-sides, and change to a new lair among the ferns; and houseless men, who have lain down with the fowls, open their dim eyes and behold the beauty of the night. . . . Even shepherds and old country folk, who are the deepest read in these arcana, have not a guess as to the means or purpose of this nightly resurrection. Towards two in the morning they declare the thing takes place, and neither know nor inquire further."

This is a very curious and interesting fact, but Mr. Stevenson is mistaken when he states that this "stirring hour," "when a wakeful influence goes abroad," between the hours of *one and two in the morning*, is unknown to those who dwell in houses. I have been aware of it for a long time, and have noticed it year after year on myself, although I dwell in a house. In the winter I usually go to sleep at 9 P.M., and then feel cold and require a good deal of bed covering to keep me warm; but between one and two in the morning I feel uncomfortable, wake, and feel hot, and am obliged to throw off some of the bed-clothes. Afterwards this discomfort passes away, I pull over me the blankets again, and go to sleep till daylight. This occurs morning after morning as regularly as possible.

In the summer I awake as regularly as possible about the same hour, and feel uneasy and toss about for some little time, although at this season no blankets are used, and then go to sleep again.

Since I have been at Fyzabad I have been able to test more accurately the hour in which this wakeful influence begins to occur. I used to awake at the usual hour, and while awake I invariably heard the railway whistle of the train which leaves for Lucknow at 12.50 A.M. Latterly I have not been noticing this whistle, and I am not aware that I wake at that hour, but there has been and is plenty of rain during this rainy season, saturating the soil and atmosphere with moisture. Probably this moisture may prevent that subtle "wakeful influence" from reaching the nervous system. Again, I am rather subject to an occasional neuralgic pain on the left side of my forehead. When this occurs at night, it goes on increasing to its *maximum* between one and two o'clock in the morning, and afterwards it begins to subside. I often suspected that some change in the *terrestrial magnetism* some time after the passage of the sun across the meridian, on the other side of the earth, may be the cause of this "subtle influence." Perhaps those who take observations on terrestrial magnetism may throw some light on this subject. Whatever may be this "subtle influence" which acts on the nervous system of animals between *one and two o'clock* A.M., there is a similar influence in the *day*, between one and two P.M., although it may not have been noticed. I have observed it, because when I get the before-named neuralgic pain in *the day*, it goes on increasing till between one and two o'clock P.M., when it begins to subside. This question arises: are the periodical exacerbations in fever and neuralgias, &c., due to some similar cosmical influence? Statistics on these points are worth collecting. It is natural to suppose that the nervous system of animals—a most sensitive tissue—would be readily influenced by any magnetic change of the earth, or by other subtle cosmical influences. E. BONAVIA

Fyzabad, August 19

A Habit of Cattle

MR. H. C. DONOVAN, in a letter headed as above (NATURE, vol. xx. p. 457), describes the bone munching of cattle in Natal, and asks whether they have a similar habit in other places. Such is the case in Norway, especially at the upper pasturages around the "saeters," or mountain chalets, where they are commonly supplied with a daily modicum of fish-bones and salt, which they eat with great avidity. There is but little lime on the Norwegian fjelds, the prevailing rock is mica schist.

Stonebridge Park, Willesden, September 17

W. MATTIEU WILLIAMS

Intellect in Brutes

LAST year we spent our holiday at Llan Bedr, Merionethshire. Our host has a house in the above village and another at Harlech, a town three miles distant. His favourite dog, Nero, is of Norwegian birth, and a highly intelligent animal. He is at liberty to pass his time at either of the houses owned by his master, and he occasionally walks from one to the other. More frequently, however, he goes to the railway station at Llan Bedr, gets into the train, and jumps out again at Harlech. Being, most probably, unable to get out of the carriage, he was on one occasion taken to Talsarnau, the station beyond Harlech, where he left the carriage, and waited on the platform for the return train to Harlech. If Nero did not make use of "abstract reasoning" we may as well give up the use of the term.

Manchester, September 20 WILLIAM HORSFALL

BERNHARD VON COTTA

ON the 14th inst. at Freiberg, in Saxony, this distinguished geologist breathed his last. Science has lost in him an ardent and conscientious follower, one in whom great powers of observation and reflection were harmoniously associated. He possessed in especial that "combining understanding" which Alexander von Humboldt so highly prized.

The youngest of four sons of the late Oberforstrath v. Cotta, of Tharand, in Saxony—a man celebrated as forester and founder of the Forstacademie in that picturesque little town not far from Dresden—Bernhard was born, October 24, 1808. His father had taken a great interest in natural sciences, and had much occupied himself with palæontology; and Bernhard appears to have inherited this taste. Early in life he was a student at the Freiberg Mining Academy—where he subsequently became Professor of Geology—and he likewise studied at Heidelberg and received a degree as Doctor of Philosophy. His intellectual activity soon became strongly pronounced and led, from the attainment of manhood till near the close of his life, to the publication of numerous valuable works. Whilst still a student at Freiburg, his first work, "Die Dendrolithen," was written (published 1832). Subsequently, associated with Prof. Naumann, he worked at the geological map of Saxony, which was published in twelve sections, and he afterwards alone completed a similar work for Thuringia. In 1836 appeared the first part of a work entitled "Geognostische Wanderungen," and in 1838 a second part; in these the principal geological features of the kingdom of Saxony are described and explained. He likewise wrote other works of great practical value, of which "Gangstudien," "Lehre von der Erzlagerstätten," and "Gesteinslehre" deserve most favourable mention. Of more theoretical value is a work which has gone through many and enlarged editions: "Anleitung zum Studium der Geognosie und Geo-

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